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10/729,684	12/05/2003	Michael Hong	252209-1020	3198

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EXAMINER	
HSU, JONI	

ART UNIT	PAPER NUMBER
2671	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/729,684	HONG ET AL.	
	Examiner	Art Unit	
	Joni Hsu	2671	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *12/5/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on December 5, 2003 was filed after the mailing date of the application on December 5, 2003. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 1 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding Claim 1, the limitation "in a *conventional* z-test matter" renders the claim indefinite because it is unclear as to what is considered to be a *conventional* z-test matter.

Claim 1 recites the limitation "the macropixel". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 8-11, 21, 23, 25, and 26 are rejected under 35 U.S.C. 102(b) as being anticipated by Gannet (US006118452A).

6. With regard to Claim 8, Gannet describes a method of rendering a plurality of graphic primitives comprising processing, within a graphic pipeline (Col. 3, lines 15-30; Col. 6, lines 6-9), only a limited set of graphic data for each primitive (Col. 13, lines 50-55); determining, for each primitive, whether the primitive has at least one visible pixel; processing, within the graphic pipeline, a full set of graphic data for only those primitives determined to have at least one visible pixel (Col. 13, line 65-Col. 14, line 5).

7. With regard to Claim 9, Gannet describes setting a visibility indicator for each pixel determined to have at least one visible pixel (*visibility pretest controller 308 sets or clears the bit in accordance with whether the fragment passed or failed all of the visibility pretests*, Col. 14, lines 18-22; *indicating whether a pixel associated with each fragment will not be visible*, Col. 3, lines 46-55).

8. With regard to Claim 10, Gannet describes that setting the visibility indicator more specifically comprises setting a bit in a frame buffer memory (*visible pretest module 202 receiving the various clear control commands and values from the frame buffer*, Col. 13, lines 16-19; Col. 14, lines 13-22).

9. With regard to Claim 11, Gannet describes that the processing only a limited set of graphic data more specifically comprises processing only location-related data (Col. 13, lines 50-55; Col. 14, lines 35-44).

10. With regard to Claim 21, Gannet describes a graphics processor comprising logic configured to limit the processing of graphic data for each of a plurality of primitives, in a first pass within a graphic pipeline (Col. 3, lines 15-30; Col. 6, lines 6-9; Col. 13, lines 50-55; Col. 13, line 60-Col. 14, line 9), wherein the limited processing determines whether the primitive has at least one visible pixel (308; *visibility pretest controller 308 sets or clears the bit in accordance with whether the fragment passed or failed all of the visibility pretests*, Col. 14, lines 18-22); logic configured to render, in a second pass within the graphic pipeline, each primitive determined in the first pass to have at least one visible pixel (Col. 13, line 60-Col. 14, line 9).

11. With regard to Claim 23, Gannet describes that the logic configured to limit the processing of graphic data is within a parser (114, Figure 1A; Col. 13, lines 50-55).

12. With regard to Claim 25, Gannet describes logic for setting a visibility indicator for each primitive processed in the first pass (308; *visibility pretest controller 308 sets or clears the bit in accordance with whether the fragment passed or failed all of the visibility pretests*, Col. 14, lines 18-22).

13. With regard to Claim 26, Gannet describes logic configured to evaluate the visibility indicator for each primitive prior to submitting the primitive to the logic configured to render in the second pass (Col. 13, line 60-Col. 14, line 9).

14. Thus, it reasonably appears that Gannet describes or discloses every element of Claims 8-11, 21, 23, 25, and 26 and therefore anticipates the claims subject.

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

17. Claim 1-3, 6, 7, and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Gannet (US006118452A) in view of Greene (US005579455A).

18. With regard to Claim 1, Gannet describes a multi-pass method of rendering a plurality of graphic primitives comprising in a first pass: passing only a limited set of graphic data for each primitive through a graphic pipeline (Col. 3, lines 15-30; Col. 6, lines 6-9; Col. 13, lines 50-55; Col. 13, line 60-Col. 14, line 9); processing the limited set of data to build a z-buffer, the z-buffer comprising a plurality of z-records, each z-record embodying z information for a plurality of pixels (302, Figure 3; Col. 12, lines 4-13; Col. 9, lines 35-43); setting a visibility indicator, for each primitive, if any pixel of the primitive is determined to be visible (308; *visibility pretest controller 308 sets or clears the bit in accordance with whether the fragment passed or failed all of the visibility pretests*, Col. 14, lines 18-22); in a second pass: for each primitive, determining whether the associated visibility indicator for that primitive is set; discarding, without passing through the graphic pipeline, the primitives for which the associated visibility indicator is not set; passing a full set of graphic data for each primitive determined to have the associated visibility indicator set (Col. 13, line 60-Col. 14, line 9); and performing a z-test on graphic data, wherein a first level of the z-test compares the graphic data of a current primitive with corresponding information in the z-buffer (222, Figure 2; Col. 12, lines 4-13; Col. 9, lines 35-43).

However, Gannet does not teach that the z-buffer is a compressed z-buffer and performing a two-level z-test. However, Greene describes a multi-pass method of rendering a plurality of graphic primitives comprising in a first pass: passing a set of graphic data for each primitive through a graphic pipeline (Col. 4, lines 38-49). According to the disclosure of this application, a compressed z-buffer provides condensed depth information for multiple pixels [0023]. Greene describes processing the set of data to build a compressed z-buffer, the compressed z-buffer comprising a plurality of z-records, each z-record embodying z information for a plurality of pixels (Col. 4, lines 30-37; Col. 5, lines 51-61); in a second pass: discarding, without passing through the graphic pipeline, the primitives that are not visible (Col. 4, lines 43-46); passing a set of graphic data for each primitive that are visible; and performing a two-level z-test on graphic data, wherein a first level of the z-test compares the graphic data of a current primitive with corresponding information in the compressed z-buffer, and wherein a second level of the z-test is performed on a per-pixel basis in a conventional z-test matter, wherein the second level z-test is performed only on pixels within a record of the compressed z-information in which the first level z-test determines that some but not all pixels of the macropixel are visible (Col. 4, lines 46-49; Col. 6, lines 20-36).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the device of Gannet so that the z-buffer is a compressed z-buffer and performing a two-level z-test as suggested by Greene because Greene suggests the advantage of rejecting hidden geometry very quickly and having an algorithm which is much faster than traditional ray-casting or z-buffering (Col. 3, line 61-Col. 4, line 4).

19. With regard to Claim 2, Gannet describes that passing only a limited set of graphic data more specifically comprises passing only location-related data through the pipeline (Col. 13, lines 50-55; Col. 14, lines 35-44).

20. With regard to Claim 3, Gannet describes that location-related data comprises X, Y, Z and W values (Col. 1, lines 29-33; Col. 13, lines 50-55).

21. With regard to Claim 6, Gannet describes that setting the visibility indicator more specifically comprises setting a bit in a frame buffer memory (Col. 13, lines 16-19; Col. 14, lines 13-22).

22. With regard to Claim 7, Gannet describes that the discarding is performed by a parser (202, Figure 2; Col. 10, lines 36-38).

23. With regard to Claim 13, Gannet describes a method of rendering a plurality of graphic primitives comprising processing in a first pass, within a graphic pipeline, only a limited set of graphic data for each primitive (Col. 3, lines 15-30; Col. 6, lines 6-9; Col. 13, lines 50-55; Col. 13, line 60-Col. 14, line 9); processing the limited set of data to build a z-buffer, the z-buffer comprising a plurality of z-records, each z-record embodying z information for a plurality of pixels (302, Figure 3; Col. 12, lines 4-13; Col. 9, lines 35-43); in a second pass, within the graphic pipeline, performing a z-test on graphic data, wherein a first level of the z-test compares

the graphic data of a current primitive with corresponding information in the compressed z-buffer (222, Figure 2; Col. 12, lines 4-13; Col. 9, lines 35-43).

However, Gannet does not teach that the z-buffer is a compressed z-buffer and performing a two-level z-test. However, Greene describes a multi-pass method of rendering a plurality of graphic primitives comprising in a first pass: passing a set of graphic data for each primitive through a graphic pipeline (Col. 4, lines 38-49). According to the disclosure of this application, a compressed z-buffer provides condensed depth information for multiple pixels [0023]. Greene describes processing the set of data to build a compressed z-buffer, the compressed z-buffer comprising a plurality of z-records, each z-record embodying z information for a plurality of pixels (Col. 4, lines 30-37; Col. 5, lines 51-61); in a second pass: discarding, without passing through the graphic pipeline, the primitives that are not visible (Col. 4, lines 43-46); passing a set of graphic data for each primitive that are visible; and performing a two-level z-test on graphic data, wherein a first level of the z-test compares the graphic data of a current primitive with corresponding information in the compressed z-buffer, and wherein a second level of the z-test is performed on a per-pixel basis in a convention z-test matter, wherein the second level z-test is performed only on pixels within a record of the compressed z-information in which the first level z-test determines that some but not all pixels of the macropixel are visible (Col. 4, lines 46-49; Col. 6, lines 20-36), as discussed in the rejection for Claim 1.

24. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Gannet (US006118452A) and Greene (US005579455A) in view of Duluk (US006476807B1).

25. With regard to Claim 4, Gannet and Greene are relied upon for the teachings as discussed above relative to Claim 1. Gannet describes that each z-record comprises a coverage mask, the coverage mask indicating which of the plurality of pixels are visible for the current primitive (318, Figure 3; *sets or clears the bit in the fragment visibility mask 318 associated with each fragment in accordance with whether the fragment passed or failed all the visibility pretests incorporated in the pretest modules 301*, Col. 14, lines 13-22; Col. 12, lines 4-21; Col. 3, lines 46-50).

However, Gannet does not teach that the z-buffer is a compressed z-buffer. However, Greene describes that the z-buffer is a compressed z-buffer (Col. 4, lines 30-37; Col. 5, lines 51-61), as discussed in Claim 1.

However, Gannet and Greene do not teach that each z-record comprises a minimum z value for the plurality of pixels and a maximum z value for the plurality of pixels. However, Duluk describes that each z-record comprises a minimum z value for the plurality of pixels and a maximum z value for the plurality of pixels (Col. 31, lines 45-57).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the devices of Gannet and Greene so that each z-record comprises a minimum z value for the plurality of pixels and a maximum z value for the plurality of pixels as suggested by Duluk because Duluk suggests that this is needed in order to have an accurate z value. With an accurate z it is known that the z value represents a surface that is known to be visible and anything in front of it is visible and everything behind it is obscured, at that point in the process (Col. 31, lines 36-63).

26. With regard to Claim 5, Gannet describes that each z-record comprises a coverage mask, the coverage mask indicating which of the plurality of pixels are visible for the current primitive (318, Figure 3; Col. 14, lines 13-22; Col. 12, lines 4-21; Col. 3, lines 46-50).

However, Gannet does not teach that the z-buffer is a compressed z-buffer. However, Greene describes that the z-buffer is a compressed z-buffer (Col. 4, lines 30-37; Col. 5, lines 51-61) and performing a two-level z-test (Col. 4, lines 46-49; Col. 6, lines 20-36), as discussed in Claim 1.

However, Gannet and Greene do not teach that each compressed z-record comprises two minimum z values for the plurality of pixels and two maximum z values for the plurality of pixels. However, Duluk describes that each z-record comprises a minimum z value for the plurality of pixels and a maximum z value for the plurality of pixels for the z-test (Col. 31, lines 45-57). Combining Duluk with Greene, which teaches performing a two-level z-test, it would be obvious to modify the device of so that each compressed z-record comprises two minimum z values for the plurality of pixels and two maximum z values for the plurality of pixels. This would be obvious for the same reasons given in the rejection for Claim 4.

27. Claims 12, 14-20, 22, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over in view of Gannet (US006118452A) in view of Griffin (US005990904A).

28. With regard to Claim 12, Gannet is relied upon for the teachings as discussed above relative to Claim 8. Gannet describes that the determining whether the primitive has at least one visible pixel ensures that the primitive does not fail a z-buffer test (Col. 9, lines 35-43; Col. 12,

lines 4-21), ensures that all pixels of the primitive are not culled, and ensures that all pixels of the primitive are not clipped (Col. 7, lines 24-38).

However, Gannet does not teach a compressed z-buffer and ensuring that the primitive does not render to zero pixels. According to the disclosure of this application, a zero-pixel primitive is a primitive that, when rendered, consumes less area than one pixel of visibility [0024]. Griffin describes a compressed z-buffer (Col. 9, lines 34-54) and ensuring that the primitive does not render to zero pixels (Col. 2, line 61-Col. 3, line 5; Col. 5, lines 26-42).

It would have been obvious to one of ordinary skill in the art at the time of invention by applicant to modify the device of Gannet to include ensuring that the primitive does not render to zero pixels as suggested by Griffin because Griffin suggests the advantage of being able to perform anti-aliasing to that anomalies such as jaggy edges in the rendered image do not result (Col. 2, line 61-Col. 3, line 5). It would have been obvious to modify the device to include a compressed z-buffer because Griffin suggests the advantage of considerably reducing the amount of data required, allowing practical implementation of a much more sophisticated anti-aliasing algorithm (Col. 9, lines 34-54).

29. With regard to Claim 14, Gannet describes a graphics processor comprising first-pass logic configured to deliver to a graphic pipeline, in a first pass, only a limited set of graphic data for each primitive (Col. 3, lines 15-30; Col. 6, lines 6-9; Col. 13, lines 50-55; Col. 13, line 60-Col. 14, line 9); logic configured to process the limited set of graphic data for each primitive to create a z-buffer (302, Figure 3; Col. 12, lines 4-13; Col. 9, lines 35-43); logic configured to determine, for each primitive, whether the primitive has at least one visible pixel (308; *visibility*

pretest controller 308 sets or clears the bit in accordance with whether the fragment passed or failed all of the visibility pretests, Col. 14, lines 18-22); second-pass logic configured to deliver to the graphic pipeline, in a second pass, a full set of graphic data for only those primitives determined to have at least one visible pixel, the second-pass logic further configured to inhibit the delivery of graphic data to the graphic pipeline for primitives not determined to have at least one visible pixel (Col. 13, line 60-Col. 14, line 9).

However, Gannet does not teach that the z-buffer is a compressed z-buffer. However, Griffin describes that the z-buffer is a compressed z-buffer (Col. 9, lines 34-54), as discussed in the rejection for Claim 12.

30. With regard to Claim 15, Gannet describes that the first-pass logic and second-pass logic are contained within a parser (202, Figure 2; Col. 13, line 60-Col. 14, line 9).

31. With regard to Claim 16, Claim 16 is similar in scope to Claim 12, and therefore is rejected under the same rationale.

32. With regard to Claim 17, Gannet describes logic for setting a visibility indicator for each primitive determined to have at least one visible pixel (308; *visibility pretest controller 308 sets or clears the bit in accordance with whether the fragment passed or failed all of the visibility pretests*, Col. 14, lines 18-22).

33. With regard to Claim 18, Gannet describes that the visibility indicator includes a single bit in a frame-buffer memory (Col. 13, lines 16-19; Col. 14, lines 13-22).

34. With regard to Claim 19, Gannet describes logic configured to associate each primitive processed in the first pass of the data with a distinct visibility indicator (Col. 14, lines 18-22).

35. With regard to Claim 20, Gannet describes logic configured to evaluate, for each primitive presented for processing in the second pass, a status of the visibility indicator associated with the given primitive (Col. 13, line 60-Col. 14, line 9).

36. With regard to Claim 22, Claim 22 is similar in scope to Claim 12, and therefore is rejected under the same rationale.

37. With regard to Claim 24, Gannet describes logic configured to build a z-buffer of data from processing of the graphic data in the first pass (302, Figure 3; Col. 12, lines 4-13; Col. 9, lines 35-43).

However, Gannet does not teach that the z-buffer is a compressed z-buffer. However, Griffin describes that the z-buffer is a compressed z-buffer (Col. 9, lines 34-54), as discussed in the rejection for Claim 12.

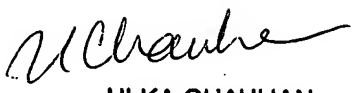
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joni Hsu whose telephone number is 571-272-7785. The examiner can normally be reached on M-F 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached on 571-272-7782. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JH



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